RDPlot – An Evaluation Tool for Video Coding Simulations

Jens Schneider
Institut für Nachrichtentechnik
RWTH Aachen University, Germany
schneider@ient.rwth-aachen.de

Johannes Sauer
Institut für Nachrichtentechnik
RWTH Aachen University, Germany
sauer@ient.rwth-aachen.de

Mathias Wien
Lehrstuhl für Bildverarbeitung
RWTH Aachen University, Germany
mathias.wien@lfb.rwth-aachen.de

I. OVERVIEW

RDPlot is an open source GUI application for plotting Rate-Distortion (RD)-curves and calculating Bjøntegaard Delta (BD) statistics [1]. It supports parsing the output of commonly used reference software packages, parsing `*.csv`-formatted files, and `*.xml`-formatted files. Once parsed, RDPlot offers the ability to evaluate video coding results interactively. Conceptually, several measures can be plotted over the bitrate and BD measurements can be conducted accordingly. Moreover, plots and corresponding BD statistics can be exported, and directly integrated into LATEX documents.

II. FUNCTIONALITY

The main functionality of RDPlot lies in parsing files, containing simulation data, and constructing RD-curves from it. For cases, in which RDPlot cannot determine the desired behavior, new curves can be constructed by selecting points manually. However, in the following the automatic functionalities are described based on the input file type:

A. Encoder Logs and `xml`-formatted data

Typically, the RD performance of video coding standards and coding tools thereof is evaluated by parameterizing the RD-curve by the Quantization Parameter (QP). To this end, multiple RD-points are obtained by encoding and decoding a video sequence at various values of the QP. In video coding research, the encoder and decoder are commonly defined by a reference software such as HM, SHM, or VTM. Generally, the corresponding encoders output information about the RD-point of the current configuration, which can be written to a file referred to as "EncLog" in the following. RDPlot can parse these "EncLogs" and connects RD-points, which belong to the same video sequence, to an RD-curve automatically. Fig. 1 shows an example directory structure for the organization of "EncLogs" belonging to different simulations. In this case, RDPlot will also calculate the BD between the "anchor" simulation points and the "tool-under-test".

The method described above can be unreliable, when novel coding tools are implemented, since bitstreams might not be decodable in case of errors, but RDPlot has no ability to read that from the "EncLog". Therefore, RDPlot can parse

```
VTM-simulations.........................Simulation root directory
    ├── anchor...........................Reference simulation directory
    │   └── log
    │       ├── SomeSequenceQP22enc.log
    │       ├── SomeSequenceQP27enc.log
    │       ├── SomeSequenceQP32enc.log
    │       └── SomeSequenceQP37enc.log
    ├── tool-under-test............Investigation simulation directory
    │   └── log
    │       ├── SomeSequenceQP22enc.log
    │       ├── SomeSequenceQP27enc.log
    │       ├── SomeSequenceQP32enc.log
    │       └── SomeSequenceQP37enc.log
    └── tool-under-test
```
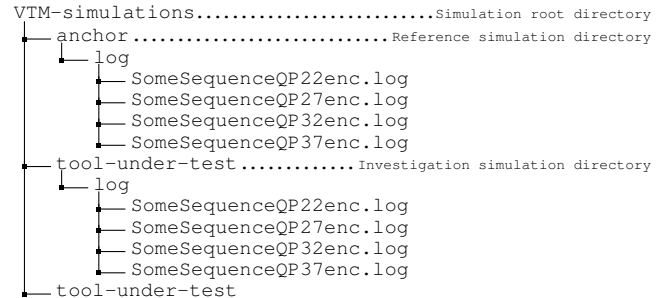
Fig. 1. Example directory structure for video coding simulations.

`xml`-formatted data, additionally. These data items could be generated by an external measurement of the RD-point, after the bitstream was successfully decoded. A specification with examples for the `xml`-formatted files can be found at [2].

B. CSV data

Simulation results are commonly shared for verification or presentation purposes. In this case, the data referring to multiple video sequences are typically stored in a single file, such as a `csv`-formatted file. RDPlot can import the data from `csv`-formatted files and plot the corresponding RD curves. If multiple files entail data for the same video sequence, BD-statistics are computed and displayed automatically. This capability allows for a quick look at some simulation data in smaller discussion groups or even larger meetings.

III. DEMONSTRATION

Typical workflows with RDPlot will be demonstrated. In particular, the automatic parsing of simulation data items will be shown and constructing additional RD-curves will be showcased. Further, the attendants will get the opportunity to ask questions, and get assistance with the installation of RDPlot, when needed.

REFERENCES

[1] J. Ström, K. Andersson, R. Sjöberg, A. Segall, F. Bossen, G. Sullivan, J.-R. Ohm, and A. Tourapis, "HSTP-VID-WPOM - working practices using objective metrics for evaluation of video coding efficiency experiments," ITU-T, Tech. Rep., Jul. 2020.
[2] [Online]. Available: https://github.com/IENT/RDPlot/wiki